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UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**
MAY 1948

EROSION CONTROL PRACTICES DIVISION

Range and Livestock Studies - C. J. Whitfield, Amarillo, Texas.-
"With the advent of rains, pasture grasses revived rapidly. Steer gains continued good to excellent. The highest gain was made by Lot 1, grazing wheat, with a daily gain per head of 3.23 pounds. Lot 3, on native and some reseeded grasses, was next, averaging 2.42, while the reseeded pasture mixture and western wheatgrass pasture showed 2.11 and 2.10 pounds respectively.

"Following the rains, crested and western wheatgrasses have greened up and made good growth. The Fairway strain of crested wheat looks especially good at this time."

Study of Methods for Improving the Seedbed for Corn - F. L. Duley, Lincoln, Nebraska.-"Special attention was given during the month to methods of improving the seedbed for corn. This spring the University obtained a Jeoffroy tillage machine. This machine was equipped with 2-inch chisel points and pulled at about 6-7 inches deep. This made narrow furrows through the soil at 12-inch intervals. Following this the soil was pulverized with different tools to give a seedbed for corn. The effectiveness of these latter implements were: (1) rod weeder (with Miller attachment), (2) Noble 4-1/2-foot sweeps, and (3) Dempster 31-inch sweeps, in decreasing order. The combination of the chisel followed by the various types of subsoilers appeared to give the best seedbed for corn of any tools that we have used. In each case the subsoiler was followed by a treader attached, which pulverized any clods or chunks which may have been thrown up by the tiller. Furthermore, it gave a smoother surface on which to plant, and killed many small weeds. One objection to the chisel implement was that it didn't work satisfactorily where the residue was very heavy. This implement needs improving for passing through heavy residue.

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** All research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

"One of the points for which we have been working is more effective pulverization of the soil through the use of sub tillers. It had been hoped that the proper type of blade might accomplish this. However, no one yet has achieved a high degree of success in this direction. It may be that the combination of two tools may prove to be the most effective, even though the cost of tillage might be increased slightly.

"Tests are being carried out to determine the effect of residue, or the extract from residue, on germination and later development of corn."

Improved Rotation Increased Yield of Oat Hay Following Cotton -
B. H. Hendrickson, Watkinsville, Georgia.-"Mr. William E. Adams' spring hay yields from triplicated plots indicated a 74 percent increase of oats cut for hay where oats followed cotton in a number of improved rotations, as compared to the oat hay yield produced after continuous cotton or continuous peanuts. The measured yields averaged 1.06 and .61 tons per acre, respectively."

Erosion Control by Small Quantities of Straw Mulch - Maurice Donnelly, Riverside, California.-"Previous field and plot observations appeared to show that when the amount of straw mulch fell below a certain point, say 500 pounds per acre, practically no control resulted from the small quantity of straw. This interpretation is probably true in a season when erosion is severe. In the season just past in southern California the erosion hazard was low. In such a season of low erosion hazard even small quantities of straw at the ground surface is effective in control. At the Haskell experimental site, in the San Geronio Soil Conservation District in Riverside County, no erosion took place on plots where surface straw was of the order of 250 pounds per acre. On like fields, conventionally tilled, with no surface straw at all, soil movement was appreciable. Thus in practical work on grain land it may be said that even a very little straw mulch is better than none."

A Hitherto Unrecognized Accomplishment in Wind Erosion Control - "Violent winds blew over the wind area of southern California in January, 1948. They were as strong and prolonged as any that have been experienced in historic time. Moreover, the previous fall had been so dry that despite the large acreage planted to cereal rye winter cover crop there was almost no surface protection against soil movement. Naturally, there was a lot of soil blown by the wind. But the remarkable fact is that it was not necessary to close any of the three transcontinental highways that traverse the area. During windstorms of comparable magnitude in previous years it was often necessary to close one or more of these highways for several days. The explanation for the difference lies, in my opinion, in the program of dune levelling sponsored by the Service and applied widely throughout the area.

"When erosion control work began in the wind area there were a few pre-agricultural and numerous post-agricultural dunes. While the pre-agricultural dunes were largely stabilized by native vegetation, the post-agricultural dunes were largely unstable. During periods of light or moderate winds these unstable dunes underwent only slight change.

In periods of heavy winds, however, they were the source of the coarse material which when carried by wind clogged the highways and reduced visibility below the safe point.

"The program of dune leveling was well-nigh completed in the last few years. The blow period of January, 1948 was the first one of top magnitude since the widespread leveling of dunes took place. This blow period brought out the fact that the dune leveling is a major accomplishment, not hitherto recognized, in wind erosion control."

The Effectiveness of Soil Cover and Conditioning in Controlling Erosion - Dwight D. Smith, Columbia, Missouri.-"A very intense rain of 1.78 inches occurred on May 1. This was one of the most severe storms experienced on the station for 15- and 30-minute periods. The effectiveness of soil cover and conditioning in controlling erosion was clearly shown by the results of this rain. All corn and soybean plots had been plowed at the time. Soil losses from these plowed plots ranged from zero to nearly 4 tons per acre, depending upon the condition of the soil as affected by previous treatment. The value of a rye cover crop in reducing erosion between corn and beans was shown by the results from 2 plots in this sequence. The rye, which was about knee-high when plowed under, apparently had dehydrated and conditioned the soil such that little runoff occurred. Soil loss from one plot was zero and from the other 0.05 tons per acre. Soil losses from the other plowed plots ranged from 0.8 tons per acre following the plowing of a good 2-year grass sod to 3.75 tons per acre following plowing of a lespedeza stubble plot which had been without soil treatment prior to 1947.

"Soil losses from meadow, rye and wheat plots were only a trace, whereas from an unfertilized oats plot the loss was nearly 2 tons per acre. The soil loss from the fertilized oats plots was only slightly over one-tenth of this amount."

Conservation Practices in Sweet Potato Production - O. R. Neal, New Brunswick, New Jersey.-"A study of conservation practices in sweet potato production is under way at the Marlboro station. This experiment was designed to study the value of corn stalk mulch for sweet potato production, and to determine the value of a year of land resting on subsequent yields of sweet potatoes. The conservation value of both the mulch and the land resting treatment has been determined in other studies.

"During the first 2 years of operation rye was broadcast on the cover crop plots just before the potatoes were dug. The digging operation covered the seed sufficiently so that a fair stand of cover crop was obtained. It was found, however, that drilling the rye after digging, even late in October, provided a more uniform stand and growth. This late seeding produces less growth, but in all cases the growth of rye has been sufficient to aid greatly in the control of water erosion and sufficient to essentially eliminate wind erosion.

"The land resting treatment in 1944 consisted of rye winter cover which was disked down in late spring and soybeans seeded. In early fall the soybeans were disked down and rye seeded for the following winter. The land was not plowed during this operation. A similar treatment using broadcast field corn instead of soybeans was applied on two additional plots during the 1947 year.

"On all treatments vine-type sweet potatoes occupy half of the plot and bush-type plants occupy the other half.

"Average sweet potato yields under the treatments listed are shown in the following tabulation.

Table 1. Average yields of sweet potatoes under different treatments.

Treatment	Yield - Bu./A.	
	Vine-type	Bush-type
None	214	188
Rye cover crop	221	218
Corn stalk mulch	198	178
Land rested - 1944	233	252

"The bush-type plants have shown more response to treatment than have the vine-type. During 1947 both types showed a yield increase on the rye cover crop areas. Yields have been reduced each year under the corn stalk mulch treatment. A possible explanation is that the mulch material may absorb and later lose to evaporation considerable quantities of water during intermittent light rains. Since the mulch material has been applied and then plowed under the following year for 4 seasons, it is planned to continue cropping the plots without further application of mulch. This will permit a study of the effect of these organic matter additions on conservation and yield.

"The vine-type plants have shown a small increase and the bush-type plants a considerable increase in yield following the land resting treatment in 1944. During 1948 yield data following the resting treatment with broadcast corn will be obtained."

Crop Yield Index for Sandy Loam and Sandy Farms in Relation to Rates of Fertilizer Application - H. O. Anderson, LaCrosse, Wisconsin.-"As was indicated in the monthly progress report for March, crop yields per acre on a group of sandy loam farms were about one-fourth higher than for the sand farm group for the years 1944 to 1947, inclusive. The records for these farms also were studied from the standpoint of the effect of commercial fertilizers on crop yields.

"The crop yield index for the sandy loam farms, on which the heaviest application of fertilizer was made, averaged 124 as compared with a yield index of 92 for the farms on which the least commercial fertilizers were made - a difference of 32 points.

"The crop yield index on the sand farms on which the heaviest application of fertilizers were made, averaged 94 as compared with an index of 71 where the least amount of fertilizer was applied - a difference of 23 points.

"It is interesting to note that the land use capability index was lower on the farms where the smaller applications of fertilizer per acre were made. Further study is needed to determine the effect of other phases of the soil conserving programs on these farms. Lack of personnel precludes the possibility of making as thorough an analysis of these records as should be made to give farm planners in the area much needed farm planning information."

Crop yield index, farms grouped according to rate of fertilizer application,
1944-1947

	No.	Land use* capability rating	Fertilizer Application per crop acre	Crop Yield Index	% of high Application
<u>Sandy Loam Farms</u>					
High application	28	57	135 lbs.	124	100
Medium application	32	52	70 lbs.	108	87
Low application	34	51	16 lbs.	92	74
Total and average	94	53	73 lbs.	108	
<u>Sand Farms</u>					
High application	26	13	141 lbs.	94	100
Medium application	19	9	49 lbs.	81	86
Low application	15	7	11 lbs.	71	76
Total and average	60	9	67 lbs.	82	

* The land use capability ratings indicate that the cropland on these farms consisted of the following approximate percentage of the various land use capability classes.

Land Use Capability Rating	% Class III	% Class IV	% Class VI
57	31	69	0
52	10	90	0
51	6	94	0
13	0	26	74
9	0	18	82
7	0	14	86

Relative Detachability of Two Silt Loam Soils - C. A. Van Doren, Urbana, Illinois.-"Soil samples from Urbana (Flanagan silt loam) and from Dixon Springs (Grantsburg silt loam) were exposed to natural rains at Urbana in accordance with specifications recommended by W. D. Ellison in the May 1947 issue of 'Agricultural Engineering.' From the storms during which satisfactory records were secured, the data indicate that the Urbana soil is more easily detached than the Dixon Springs soil.

Relative Detachability of Two Soils ^{1/}

Date of Rain	Rainfall Inches	Intensities (In/Hr)			Splash				
		5	15	30	Sand gms.	Flanagan gms.	D 2	Grantsburg gms.	D 2
5/2/48	0.75	2.16	1.80	1.04	24.3	7.9	0.32	6.9	0.28
5/7/48	0.83	0.36	0.20	0.18	8.4	3.9	0.47	3.0	0.36
6/6-8/48	0.86	1.68	1.12	0.68	17.77	5.3	0.30	3.9	0.22

^{1/} D 2 = gms. soil detached and splashed from cup + gms. sand detached and splashed.

Visitors at the LaCrosse, Wisconsin Station - Orville E. Hays, LaCrosse, Wisconsin.-"This promises to be an outstanding year for the number of persons visiting the Station. During the month of May seven groups visited the Station and 23 groups have been scheduled to go over the work of the Station in June. These groups consist primarily of veterans' farm trainee classes, soil conservation district groups, and farm bureau groups. They vary in size from 25 to 40 persons. It is believed that by having smaller groups that the individual farmer or businessman has more opportunity and feels freer to ask more questions. Each group is from one locality and it is then possible to discuss conservation problems as they pertain to that particular locality. With large field days, conservation problems must be discussed in general terms and it is not possible for the individual to ask many questions.

"Following is a list of groups scheduled to visit the Station during the month of June:

- June 4: Vernon County, Wisconsin, SCD
- 5: Wabasha County, Minnesota, Farm Bureau
- 7: Eau Claire County, Wisconsin, SCD
- 9: Farmimore, Wisconsin, Veteran on-the-farm trainees
- 10: State Conservationists, Region III
- 10: Arcadia, Wisconsin, Veteran on-the-farm trainees
- 11: Wilton, Wisconsin, Veteran on-the-farm trainees
- 11: Portage, Wisconsin, Veteran on-the-farm trainees
- 11: Eau Claire County, Wisconsin, SCD
- 14: Crawford County, Wisconsin, SCD
- 15: East Fillmore County, Minnesota, SCD
- 15: Dodge County, Minnesota, SCD
- 15: Sauk County, Wisconsin, Veteran-on-the-farm trainees
- 16: Wisconsin College of Agriculture, Staff members
- 17: Upper Zumbro, Minnesota, SCD
- 17: At Owen, Wisconsin - Clark County SCD, and State Soil Conservation Committee
- 18: Trempeleau County, Wisconsin, SCD
- 18: Appleton, Wisconsin - Veteran on-the-farm trainees
- 21: At Owen, Wisconsin - Clark County SCD field day
- 23 & 24: Cornbelt Section of Society of Agronomy at Owen and La Crosse Stations
- 25: Mabel, Minnesota, Veteran on-the-farm trainees
- 27: Eau Claire County, Wisconsin, SCD
- 30: Monroe County, Wisconsin, SCD and clergymen

The Effects of Stubble Mulch Versus Plowing On Soil Temperature - C. L. Englehorn, Fargo, North Dakota.-"After a rather extended cool wet spring the wheat crop was seeded on the tillage plots at Langdon on the eighth of May. On May 20, thermocouples were installed in order to study the effect of tillage on soil temperature during the season. It appears possible that the soil temperature differences between plowing and stubble mulch tillage may affect microbiological activity to the extent of affecting final crop yield. The object is to determine the extent of the soil temperature variation between plowing and stubble mulch tillage and the extent to which this variation continues during the season.

"The soil temperatures as they occurred at 4:00 p.m. of May 21 are presented in the following table. Each temperature figure is the average of three thermocouple readings. The atmospheric temperature at the time of reading was 77.0 degrees Fahrenheit. At a depth of 1 inch the soil temperature of the stubble mulch plot was 78.2 degrees Fahrenheit, or 1.2 degrees above atmospheric temperature. Soil temperature at the same depth of the plowed plot was 84.7, 7.7 degrees higher than atmospheric temperature and 6.5 higher than that of the mulch plot. This difference in soil temperature, though of lesser magnitude, continued to a depth of 8 inches where the temperature was 57.9 on plowing and 54.4 on stubble mulch tillage, a difference of 3.5 degrees.

Surface soil temperatures in degrees Fahrenheit as affected by plowing and by stubble mulch tillage at Langdon. Readings taken at 4:00 p.m., May 21.

Soil Depth	Soil temperature at given depths				
	1"	3.5"	6"	8"	Average
Plowing	84.7	71.1	61.7	52.9	68.9
Stubble mulch	78.2	67.4	57.7	54.4	64.4
Difference	6.5	3.7	4.0	3.5	4.5

Legume Root Penetration of a Tight Phase Carrington Soil Receiving Different Rates of Lime - G. M. Browning, Ames, Iowa. - "Dr. Kirkham, Mr. Van Bavel, both of the Soil Subsection, and I spent two days in Howard County collecting soil samples for certain physical determinations on the legume liming experiment. This experiment includes a comparison of six legumes with 4 rates of liming. The legumes are: Birds Foot Trefoil, Ladino clover, Alsac clover, Sweet clover, alfalfa and red clover. Rates of lime are: 0, 1-1/2, 4-1/2, 6-1/2 tons per acre. These plots were established 4 years ago and it seemed advisable to study the effect that these different legumes might have had on soil aggregation, porosity and other physical properties that directly or indirectly affect drainage. Soils at the Howard County Farm are tight phase Carrington and drainage is a severe problem on most of the land in any season. Observations were also made of the root penetration of the different legumes. A more detailed report is being prepared. In general, however, there was little or no evidence of root penetration below the 10-inch layer for crops other than alfalfa, sweet clover and birds foot trefoil. Sweet clover was in the second year in 1947 and was killed when harvested for hay in June. At the 10-inch depth there was a large number of openings some of which appeared to have been made by earthworms or other rodent but the logical opinion here was that it was from sweet clover roots. On the highly limed areas these were estimated as one per square inch. On the unlimed areas these were estimated as one per square inch. On the unlimed areas there was one for about every 5 or 6 square inches. Alfalfa roots were found to a depth of 24 inches. At that depth the root was rotted off apparently because of the water table that had been at that level sometime during the previous or earlier season. The roots at that depth were about half the size of a lead pencil and indicated that at a certain time the water table had been lower and the roots had extended below the 24-inch depth."

Chlorosis in Velvet Bean Corrected by Sulphur Compounds - Richard M. Smith, Mayaguez, Puerto Rico.-"In the greenhouse it now seems certain that the distinct chlorosis noted on the velvet beans growing on the Utuado sandy soil was a result of sulfate deficiency. The condition was quickly improved or cured by any sulfate treatment.. used including sodium sulfate and ammonium sulfate as well as several others. A sulfate treatment was also given to certain pots of the beans growing on Catalina clay soil and it is believed that some benefit may have resulted, but the chlorotic condition was never so serious on the Catalina soil as on the Utuado sand. We have taken photographs of the leaf colors and have measured the difference in light transmission by the different colored leaves and are now harvesting the crop of velvet beans. It is our intention to analyze selected plants and composites of the soils to determine the differences in sulphur content associated with the different chlorotic conditions. Further greenhouse and field studies are contemplated."

Organic Matter Increase on Bench Terraced Land - "Some detailed soil samples collected on the bench terraces at Las Ochenta where we expect to plant certain food crops for preliminary management studies show some interesting differences in soil organic matter. The surface layer from 0 to 1-1/2 inches contained about 3.0 per cent. The 1-1/2 to 3 inches layer - 1.7 percent, and the 3 to 6 inches layer - about 1.4 per cent. These terraces represent approximately what has been built into the soil by a cover of grass and of legumes over a period of about ten years. These terraces were made by hand and consisted of raw subsoil in the beginning, which contained only a small fraction of 1 per cent of organic matter. The marked decrease in organic matter with depth shows clearly that the build-up is much greater near the surface. We hope to obtain other samples from the farm of Mr. Rafael Vidal to obtain an additional check on the rate of organic matter build-up on bench terraces in this vicinity. Other information on this subject will also be forthcoming from studies of the samples already collected from the runoff erosion plots."

Nitrate Nitrogen in Relation to Stubble Mulch and Plowing Methods
T. W. Edminster, Blacksburg, Virginia.-"The preliminary results of the laboratory tests for nitrate-nitrogen on the stubble mulch plots have just been worked out. On the following table are figures showing the pounds of nitrate-nitrogen available prior to any tillage together with the same values just at planting time. On the summary column is shown the average increase in nitrate-nitrogen on plots which constitute the 'checks' and on the plots which are under a stubble mulch 'treatment'. It is evident in Blocks 'A, B and C' that there is a greater increase in the nitrate-nitrogen levels under the check or turn plow and disc type of tillage between the time of initial tillage and planting than appears under the stubble mulch treatments. It is this difference that has been noted in previous years and which has constituted one of the biggest problems in developing good healthy early growth of the corn plants. In Block 'D', it will be noted that the turn plow plus the spring tooth harrow showed slight increase over and above the check. Detailed statistical analyses to determine the significance of this difference has not been carried out."

Changes in Nitrate-Nitrogen levels during period prior to initial tillage and planting time on
Stubble Muck Plots

Block	Tillage Treatment	Plot	3/18/48 lbs/Acre ^{3/}	5/11/48 lbs/Acre ^{4/}	Difference	Summary
A	3" top cut inverted ^{2/} 4" bottom cut - plus disc harrow -- Plots 2, 3 & 5 Turn plow and disc checks Plots 1, 4 & 6	1 (0-6)	1.79	7.21	5.42	Average increase in nitrate- nitrogen on Check - 4.96 lbs/A Average increase in nitrate- nitrogen on Treatment-1.96 #/A
		2	1.52	2.70	1.18	
		3	1.49	4.02	2.53	
		4	1.71	5.53	3.82	
		5	2.28	4.45	2.17	
		6	2.57	8.23	5.66	
B	3" top cut inverted ^{2/} 4" bottom cut - plus spring tooth harrow Plots 1, 4 & 5 Turn Plow and Disc Check Plots 2, 3 & 6	1 (0-6)	3.00	6.07	3.07	Average increase in nitrate- nitrogen on Check-7.34#/A Average increase in nitrate- nitrogen on Treatment-2.80#/A
		2	3.81	11.53	7.72	
		3	5.18	10.29	5.11	
		4	3.21	5.96	2.75	
		5	2.44	5.03	2.59	
		6	3.73	12.92	9.19	
C	3" top cut inverted ^{2/} 4" bottom cut - plus spring tooth harrow Plots 2, 3 & 5 Turn plow and disc Check plots 1, 4 & 6	1 (0-6)	1.65	5.05	3.40	Average increase in nitrate- nitrogen on Check-4.27#/A Average increase in nitrate- nitrogen on Treatment-2.57#/A
		2	1.86	6.15	4.29	
		3	2.14	2.62	.48	
		4	4.19	9.19	5.00	
		5	2.22	5.14	2.92	
		6	2.03	6.45	4.42	
D	Turn plow plus spring tooth harrow - Plots 2, 4 & 6 Turn plow and disc harrow Check plots 1, 3 & 5	1 (0-6)	3.13	10.15	7.02	Average increase in nitrate- nitrogen on Check-3.73#/A Average increase in nitrate- nitrogen on Treatment-4.64#/A
		2	2.92	11.26	8.34	
		3	4.01	8.64	4.63	
		4	3.21	7.51	4.30	
		5	7.60	7.14	.46	
		6	1.40	2.67	1.27	

1/ Phenol-disulphonic method.

2/ TNT plow.

3/ Nitrate-nitrogen #/A prior to any tillage

4/ Nitrate-nitrogen #/A following ordering of land and just prior to planting.

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - W. D. Ellison, Beltsville, Maryland.-"I returned from the Texas and North Carolina work about May 1 and started plans for some erosion work at Beltsville. During the month some storms were sampled in order to determine the detaching capacity of the falling rain-drops, tests being made with the splash dish containing standard sand.

"Plans are under way for a new type of raindrop applicator, and at present this work is confined to a search for new materials and some new types of nozzles."

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"All of the 3.42 inches of rainfall this month occurred before May 18.

"There is a wide-spread interest in the use of 2,4-D for cornland in this area. It was deemed necessary to study the hydrologic effect of its use and of the elimination of cultivation on cornland - both plowed and mulch watersheds.

"The plan is as follows:

<u>Watershed</u>	<u>Treatment</u>
106	Corn; plowed; planted in straight rows; cultivated for weed control.
121	Corn; plowed; planted on contour; cultivated for weed control.
188	Corn; disked (mulch); planted on contour; 2,4-D for weed control.
191	Corn; plowed; planted on contour; 2,4-D for weed control.

Runoff and soil loss will be measured from each of these four watersheds.

"Already we have noted a hard crust formed on the plowed watershed No. 191. Some corn cannot break through the crust - resulting in a poorer stand. The 2,4-D has to this date, good control of weeds. On mulch watershed No. 188, the crust is not as extensive or severe and the corn came through better. Here, also, the 2,4-D appears to be effectively controlling the weeds. There were no runoff periods on any of these four watersheds after they were plowed or disked for corn."

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebraska.-"May continued dry, with 1.80 inches of rain, which fell during the first and last part of the month. These were very timely showers but the amounts were not sufficient to supply ample moisture to the growing crops. May rainfall was about 45 percent below normal, which is also about the same percent of deficiency experienced in the past 11 months. Last June, 6.31 inches of rain fell, but since that time only 11.3 inches of precipitation has been measured."

Hydrologic Studies - G. A. Crabb, Jr., East Lansing, Michigan.-"Precipitation for the month of May, as measured on the project with United States Weather Bureau type non-recording rain gages, amounted to 5.55 inches for the cultivated watersheds, 4.28 inches for the wooded watersheds, and 5.40 inches for the stubble-mulch plots. The United States Weather Bureau office at East Lansing reports 5.35 inches of rainfall, or 156 percent of the 50-year average of 3.42 inches for the month of May. Precipitation on the research project amounted to 162 percent, 125 percent, and 158 percent of the East Lansing 50-year average. There was runoff during the period as follows:

Date	Watershed	Precipitation (inches)	Runoff (inches)	Soil loss (lbs/acre)
5/10	"A"	3.13	0.0687	1.23983
5/10	Wooded	2.42	.4288	*
5/10	"B"	3.13	.0043	T
5/16	"B"	0.80	.0381	T

* Sample lost due to leak in silt box. Repairs have been made.

"On May 3 the project was visited by Mr. R. C. Behymer, Assistant Chief of the Regional Administrative Services Division, and the installations examined in detail. Watershed "B" was plowed and cultipacked on this date, preparatory to planting to corn. Corn was planted May 25, with runoffs occurring on May 10 and 16, while the soil was in extremely vulnerable condition. Surprisingly enough, the runoffs produced minor soil losses; it is felt that these rains occurring just after plowing, fell on land that was made highly absorbent through having a recent dense cover of brome-alfalfa turned under. And the intensity of these rains was so gentle as to permit almost complete absorption. The increased amount of runoff occurring May 10 at the wooded watershed was due to the amount of soil moisture present before precipitation occurred."

Runoff Studies - N. E. Minshall, Madison, Wisconsin.-"At Fennimore precipitation for the month was 2.99 inches as compared with a normal of 4 inches. All of this amount occurred in the first 20 days. There were no high intensities and there was no surface runoff. Temperatures were about 5 degrees below normal with a maximum of 84 degrees on the 20th and a minimum of 28 degrees on the 8th.

"Precipitation at Edwardsville was 4.06 inches or near normal. All of this amount came in the first 21 days. Surface runoff from the 50-acre watershed totaled about 0.50 inch. Temperatures averaged about 7 degrees below normal with a maximum of 81 degrees on the 23rd and minimum of 36 degrees on the 25th.

"On May 10 and 18, I conferred with Professor Lenz and Dr. Muckenhirm of the University, and Mr. Prochaska of the Wisconsin Highway Commission in regard to selection of the number of watersheds as requested by the Public Roads Administration. The purpose of these conferences was to try and influence the selection of watersheds according to definite soil types rather than have them picked at random. The Public Roads Administration representative has expressed himself as not being in favor of areas less than 25 square miles. At this meeting we tried to prevail upon Mr. Prochaska to recommend a few somewhat smaller areas.

"During the period of May 25 to 29, I made a survey of the proposed weir sites on the 300-acre watershed near Colby, Wisc. This is a part of the cooperative project with the Wisconsin Valley Improvement Company. Our plans are to try and establish this station during the next two months."

Farm Ponds - T. W. Edminster, Blacksburg, Virginia.-"During the latter part of May Mr. Holtan visited the SCS offices in the Ridges and Valleys Region in an effort to arrange for field tests of the application of the laboratory findings in sealing farm ponds through soil compaction. There is some possibility that trial applications may develop at Winchester, Harrisonburg and Roanoke; however, there seems to be a feeling among most of the pond builders that farm pond sealing should consist of some mysterious substance which can be added to the soil rather than by an objectively approached problem. Until such time as the field personnel and pond owners can more fully appreciate the importance of dealing with simplified methods it may be difficult to find areas where the research results may be tested."

Sedimentation Studies - L. C. Gottschalk, Washington, D. C.-"Much time was spent during the month in checking calculations of the sedimentation survey of Spring Lake, Macomb, Ill., and the resurveys of West Frankfort Reservoir, West Frankfort, Ill., and Rainbow Lake, Spartanburg, S. C. The surveys of Spring Lake and West Frankfort Reservoir were made by the State of Illinois, in cooperation with the Soil Conservation Service, during the summer of 1947. The resurvey of Rainbow Lake was made by Operations personnel and under supervision of the

Sedimentation Section, Office of Research, in March 1947. A preliminary report has been completed on the results of the survey of Spring Lake, and a report on Rainbow Lake is in progress.

"Considerable time was spent in reviewing methods of calculation of reservoir sedimentation data to increase accuracy of results for segments of reservoirs developed in winding valleys. This work was carried on in cooperation with Dr. Henry Hopp. The present method of calculation involves determination of water and sediment volumes of segments between ranges by use of a modified prismoidal formula. This formula results in volumes which are too low when the segments are curved. A new method, based on regression analysis, has been developed and tested on three reservoirs. The results so far indicate that this method may give more accurate results than the method now in use, is faster, and provides a measure of the probable accuracy of results. Work is being continued on this investigation."

Drainage Studies - M. H. Gallatin, Homestead, Florida.-"Readings during this period showed a steady increase to the last week of the month when we had a light to heavy rain over the area. Readings during this last week following this rain were all low. On one of the groves during the latter part of the month we had a rain of 1.90 inches in about 1-1/2 hours, with a total of 2.20 inches for a 6-hour period. We found that at the end of 7 days our readings indicated that the soils of this area had just about reached the wilting point. This 2.2-inch rain actually lasted no longer than an inch of water. Our data to date indicates that rain or irrigation water in excess of an acre-inch is lost through percolation. For the area as a whole there would be a variation between 3/4 and 1-1/4 inches depending upon the amount of organic matter, mulching and type of soil material.

"Moisture readings on our mulch plots followed the same pattern as the previous month, that is check, natural cover, pine straw, grass and shavings. Shavings mulched areas during dry weather will conserve moisture longer than any of the other materials. At the end of the month a rain of 0.6 inch was recorded. We then had a reversal in our readings with shavings trailing. Shavings have a tendency to shed water and it takes a good bit more rain before shavings mulched areas show much increase.

"Indications are that during the period immediately following application to approximately 12 days, uramon is readily lost through leaching. On one of our groves uramon was applied between April 19 to April 26. On the 26th there was an increase in nitrates showing that the uramon was reverting to ammoniacal nitrogen. On the 26th in the late afternoon and evening we had a rain of 2.2 inches. The following week the nitrates had dropped from 46 to 7 p.p.m. This is the first time we have had a

heavy rain so closely following application. Other data have shown that after uramon has reached the peak we lose the available portion, but there is a reserve of ammoniacal nitrogen which is again released. Indications are that when we have complete reversion of the uramon it will not leach too readily, but during the period of application to the peak of release it is possible to lose all or nearly all of the application."

Drainage Studies - T. W. Edminster, Blacksburg, Virginia.-

"Permeability determinations for Sites VA-94 through 100 have been completed and tabulated. Sites VA-101 and 102 have been sampled and are now under testing in the laboratory. A comparison of the rate of percolation for the 3-inch cores driven has been made with that of the 3-inch cores jacked. All the pertinent data to date were used. The rate of percolation for the cylinders jacked exceeded that for the cylinders driven. However, interaction between the horizon sampled and the method of sampling is significant.

"The drainage engineer accompanied Mr. R. E. Devereux, Virginia State Soil Scientist, SCS, to Kingstree, S. C., to attend a field study on "Field Clues in Determining Soil Permeability." Mr. A. M. O'Neal, SCS Operations, Washington, D. C., lead the discussions, bringing out pointers in soil texture and structure which he believed needed more careful consideration by field soil survey personnel.

"On May 18 and 19, the Project Supervisor together with the State Conservationist attended a field conference of Operations and Research in the Suffolk area to discuss the Operations work program in drainage together with the most urgent problems that are faced in that area. After a review of the field problems and discussion of ways and means of meeting them, the following outline was developed as a proposed program of work during the coming year:

1. Continue operation on Presson farm draw-down pump.
 - a. This installation consists of one draw-down pump, water meter, pump operation recorder, four recording water table observation wells and 40 manually read observation wells installed on Lencir fine sandy loam and designed for tile depth, spacing and permeability - draw-down relationship studies.
2. Install one draw-down pump with five recording water table observation wells and a standard set of manually read observation wells on the Lee farm.
 - a. This installation would give tile depth and spacing data under Moyock soil conditions.

3. Install in the Virginia Dare District two systems of combined recording and non-recording observation wells on wide spaced open ditch systems in heavy soil types..
 - a. Each installation would include five recording wells together with an adequate number of manually operated wells to give complete records of the draw-down curve characteristics together with rates of change in relation to water table position.
4. Select and install on carefully determined areas a mutually read observation well system across either tile or open ditch in each of six or seven work units in the southeastern drainage problem area of Virginia.
 - a. These wells would be read by Operations personnel in accordance with the procedure established by the Research engineer and as agreed upon at the conference referenced above.
 - b. All sites will be selected to give maximum information on drainage design problems for the predominating conditions in each work unit.
5. Intensify studies on Moyock (quick-sand) problem areas.
 - a. Placement studies.
 - b. Sedimentation studies.
 - (1) Check siltation on other systems in addition to that on the Lee farm.
 - c. Continue cooperation with State and District personnel in the design and development of adequate machinery for use in quick-sand.
6. Study open ditch maintenance methods.
 - a. Methods of establishing vegetal protection on banks of large mains.
 - (1) Mulch and seeding methods.
 - b. Investigate types of light farm-owned equipment suitable for maintenance of small V-type ditches by farmer with farm equipment.
7. To assist in the installation of deep lime placement studies.
 - a. These studies are to support and encourage the establishment of deep rooted legumes for improvement of permeability and drainage; and to determine possible structure improvement through combined mechanical and chemical actions as reflected in drainage characteristics."

Supplemental Irrigation Studies - J. R. Carreker, Athens, Ga.-

"The months of April and May have been filled with intense activity by the personnel on the supplemental irrigation research project. Frequent rains throughout the winter months largely prevented any field work.

"Rainfall in April totaled only 1.43 inches, as compared to an expected 3.97 inches, while evaporation from a pan totaled 5.59 inches. A drought of 26 days duration began on April 9 and was broken May 5 and 6 with rains of 0.67 and 0.55 inch on these days. There immediately followed these showers 18 more days of drought. This second dry spell was broken with 0.56 inch of rain on May 25 and then 2.16 inches on May 28 and 29.

"Rainfall in May totaled 4.27 inches with 2.81 inches falling May 25-29. Evaporation measured from a Weather Bureau type pan was 6.86 inches.

"Irrigations were made on the various crops under study as follows:

Pasture: April 28 - 29 - 2.0 inches
 May 20 - 21 - 2.0 inches
Corn (all plots): April 25 - 26 - 1.0 inch
(Treatment 3 plots): May 25 - 1.0 inch

Vegetables:

Fixed minimum and furrows: May 14 - 1.0 inch
 May 20 - 1.0 inch
Evaporation basis: May 14 - 1.0 inch
 May 19 - 1.0 inch
 May 25 - 1.0 inch

"The effects of the irrigations on the corn and vegetables May 25 were largely lost because of the rains that followed. The other applications were interspersed between rains so that they had time to be effective in increasing plant growth.

"Soil moisture readings indicated ample subsoil moisture throughout the dry spells in April and May. Despite this ample subsoil moisture, the topsoil became quite dry. Light irrigations of about 1 inch were indicated for this season of the year."

IRRIGATION DIVISION

Drainage of Irrigated Lands, Imperial Valley - George B. Bradshaw, Imperial, Calif.-"Reports on yield increases due to tile installation, leaching and better irrigation practices are being obtained as crops are harvested. The results on two 160-acre plots are as follows:

"The plots were tilled in July of 1947 and gave a subsequent leaching of 62 days. This work gave an increased yield as listed in the following table:

<u>Crops before tiling</u>		<u>Crops after tiling and leaching</u>	
1947	Barley 2,200 pounds per acre	1948	Barley 4,600 lbs. per acre
1947	Flax 1,120 pounds per acre	1948	Flax 1,624 lbs. per acre

This is an increase of 109 percent for the barley and 45 percent for the flax. The flax increase was not as great as the barley and was partly due to a heavy frost during the first bloom. This frost is estimated to have cut the flax yield 560 pounds per acre."

Permeability Studies - V. S. Aronovici, Pomona, Calif.-"Permeability samples were taken in the Yucaipa Soil Conservation District with the R. E. Uhland sampling unit and the unit developed by the Division at Pomona. Quantitative comparison is rather difficult because of the different techniques of permeability measurement. The Pomona unit, utilizing a tension table and Mariott bottles to maintain a constant head. Discharge is measured at frequent intervals over a period of 6 to 8 hours while the Uhland unit measures the aggregate discharge for the period of the run. Values derived by this unit measures discharge in inches per hour, but does not relate discharge directly to head. The Pomona unit utilizes the values of unit head, unit time, and unit discharge or coefficient of permeability. Nevertheless, a good qualitative comparison was obtained. By comparing the 1 hour reading of the Pomona and Uhland units, the best comparisons were obtained. See table 1.

Table 1.--Comparison of average soil transmissibility values for the Uhland and Pomona permeability equipment

Cultural practice	Depth <u>Inches</u>	Pomona unit <u>1/</u> Inches/inch ² /hr.	Uhland unit <u>2/</u> <u>Inches/hr.</u>
Clean cultivated	2-4 and 1-4	0.38 ^{3/}	0.14
	15-17 and 15-18	2.58 ^{3/}	2.34
Non-tillage weed-free cultivated with cotton waste mulch	1-3 and 1-4	0.98 ^{3/}	1.34
	12-14 and 12-15	2.72 ^{3/}	2.94

1/ 2 inches x 2 inches soil cylinders.

2/ 3 inches x 3 inches soil cylinders.

3/ Coefficient of permeability for first hour run.

"It is worthy to note that relatively the results are the same. Non-tillage weed-free soil showed markedly higher rates than the cultivated field in the surface soil. This influence is only slightly felt at 14-inch depth. After a total of 15 to 17 inches has percolated through the Pomona soil units, the large difference between the non-tilled field and the cultivated field became less marked. Comparison of volume weights showed that the 3-inch core of the Uhland unit were slightly lower, suggesting that possibly the 2-inch cores did cause some compaction. Still differences in permeability values were inconsistent. No comparison of the two units will be continued."

San Fernando Valley Drainage Investigations - W. W. Donnan, Los Angeles, Calif.--"Field work continues on the detection of leakage from artesian wells in the San Fernando Valley. In the area under investigations there are 123 wells which at one time or another have been used for irrigation purposes. These wells range in depth from 160 feet to 642 feet. Several other wells in the area over 1,000 feet deep were originally drilled as oil wells. The following tabulation of well depths indicate

the range and percentage in each depth classification.

"Depth of wells in the San Fernando Soil Conservation District, Los Angeles County, California:

<u>Depth in feet</u>	<u>Percentage</u>
100 to 200	36
200 to 300	25
300 to 400	15
400 to 500	13
500 to 1000	8
over 1000	3

"An attempt is now being made to locate the source of the artesian flow detected in a number of these wells."

George D. Clyde, Logan, Utah.--J. H. Maughan reports, Utah drainage districts have had a varied experience and the differences in the degree of success in the drainage of farm land have been very wide. A total of 39 districts were organized during 1914 through 1942, most of these being created during or soon after World War I. Only two new districts with small areas of land have been established since 1928; and two other drainage enterprises, established years before, were reorganized as drainage districts--thus making only four in a period of 20 years.

A total area of 305,661 acres was included in the 39 organized drainage districts. Drains were installed in 32 districts to serve 153,807 acres, of which about 97,619 acres, or a little less than one-half of the area included in the districts, is now in cultivated crop production. Eight districts, after being organized, failed to install drainage systems. Two districts that organized and installed drains were later dissolved, and eight districts with their installed drains were allowed to become inactive. Twenty-one districts are now actively maintaining their drains.

W. C. Barrett reports, completion of the plans for a proposed cooperative Mechanical Research and Maintenance Laboratory. This laboratory which, if approved, will be cooperative between the Soil Conservation Service, the Utah Scientific Research Foundation, the Agricultural Experiment Station and the Utah State Engineering Experiment Station.

Water Spreading - A. T. Mitchelson, Dean C. Muckel, and H. K. Rouse.-- A new well has been drilled and supply tanks were being constructed and installed by the Kern County Water Storage District as a permanent and continuous water supply for the Minter Field experimental ponds. In the past, these ponds could be operated only while there was flow in the Lerdo Canal, which frequently was for the spring and early summer months

only. Thus, there was always a break in the records of percolation of the Minter Field ponds. This made it impossible to compare percolation rates with the continuous records of the Lasco ponds. The Madera strips which winter precipitation indicated could not be operated at all this year, will not probably be operated up to September 1.

In accordance with the decision made at the conference of representatives of the Kern County Land Company, the Bureau of Reclamation, and the Division of Irrigation on April 13, operation of concentric ponds to study the effect of buffer ponds was continued throughout May. The operation was closed down after the record for the month was completed and the ponds will be permitted to dry out. After the soil moisture declines to about 5 percent in the top 6 inches, operation will be resumed.

The rates of percolation for the Minter pond dropped from 0.80 foot per day on May 1 to 0.29 on May 31. The rates of percolation for the buffer pond dropped from 0.49 foot per day on May 1 to 0.24 on May 31. The ratio of the rates in the buffer pond to those in the inner pond rose as the rates dropped. The difference in rates at the end of May was insignificant.

Foster Creek Survey (for Operation) - Paul A. Ewing.-Most important activity of the month was participation in the Foster Creek survey. Mr. Ewing joined Carroll Dwyer in Portland the morning of May 17 and that day drove to Wenatchee, Wash., where other members of the party, including personnel of SCS, Bureau of Agricultural Economics, Bureau of Plant Industry, Soils and Agricultural Engineering, and Washington State Agricultural College, were joined. The following 2 days were spent in a reconnaissance of the proposed project. This consists of several disconnected areas on both sides of Okanogan River and other similar undeveloped and partly developed tracts on Columbia River near the junction of the two streams.

These lands can be irrigated only by pumping through lifts, the minimum of which appears to be about 400 to 500 feet. Foster Creek dam, a structure authorized for construction by the U. S. Army Engineers, is to be essentially a power dam, and if irrigation is to be added it is probable that the Bureau of Reclamation will handle that feature. Since no cost figures for irrigation were available, the party decided to undertake an analysis that would appraise the quality of the land and its probable capacity for agricultural production, the cost of water being omitted. If water-service costs expected to be calculated by the Bureau of Reclamation do not increase other estimated costs of production beyond probable financial returns from farming, the project will appear to be feasible; otherwise, not.

In the concluding discussions with authorities of Washington State Agricultural College at Pullman a tentative outline for report was drawn. This was to be submitted to the Columbia Basin Commission at Spokane on May 27. As this presentation did not seem to require the attendance of

the whole group, Mr. Dwyer was delegated to the job. Word regarding the action on our proposal has not yet been received from Mr. Dwyer, but in anticipation of a favorable decision such material as could be found in the Berkeley files suggesting possible usefulness has been sent to Mr. Criddle and to Karl Landstrom, of Bureau of Agricultural Economics, who will handle the detailed economic examination. As Mr. Ewing's association with the work is that of a technical adviser, he expects to participate further in the work only after the detailed surveys are finished, probably in September, when another meeting of the group will be held to analyze the possibilities of the project.

If this study proceeds as expected, it may prove to be the first of many similar efforts by the Department of Agriculture to participate, at least, in evaluating the agricultural feasibilities of reclamation projects proposed for construction by the Federal Government. If this expectation is justified, the Foster Creek survey is important, but judged on the basis of its own merits it probably is not.

Flow of Water - The San Diego Results and Reynolds No. R. - Fred C. Scobey.-In discussing the San Diego tests, Mr. Scobey has been asked how the results fit with the usual curves set up in logarithmic plotting of Reynold's Number R and Weisbach's "friction" factor, f. Using a diagram developed by the U. S. Bureau of Reclamation showing this set-up for 17 researcher's plottings of their data on flow of water in "smooth" pipes, with a few exceptions the data already on the diagram fall in a narrow band between lines of ± 5 percent variation from the base median curve. This band and median line vary from a value of about 0.045 for low values of R just beyond the scatter zones where flow changes from Reynold's critical velocity to values of 0.01 for R in the 10^6 zone. Our results conform to this same band with many points in rather high values of R.

Mr. Scobey's hope has been for many years to show that a formula can be developed that avoids the variation in the friction factor, such as f in Weisbach. The variation in f, from Weisbach, is unavoidable because Weisbach's formula places the loss of head as a function of the square of the velocity and inversely as the first power of the diameters. Both of these are incorrect for water flow in usual velocities and pipe sizes. The loss varies as something less than the square of the velocity (Hazen has it as $v^{1.852}$) and inversely as something more than the first power of diameter d. (Again, Hazen has it as $d^{1.17}$.) All research for the past 30 or more years has indicated the Weisbach's assumptions were incorrect, as to v^2 and $d^{1.0}$.

Silt Studies - Dean W. Bloodgood, Austin, Texas.-On the 3rd, Mr. H. A. Beckwith, a member of Texas Board of Water Engineers and one of our cooperators, and I made a trip to Natalia where we contacted officials of Bexar-Medina-Atascosa Counties Water Improvement District No. 1, in regard to their cooperation in making a silt survey of Medina Lake. The lake has been practically dry for several months. We were

successful in interesting the district officials in making a cooperative survey of the sedimentation of the reservoir. Col. W. A. Tuttle, Chairman of the Soil Conservation District, was also interested in the survey and offered his cooperation and that of the San Antonio Chamber of Commerce. We also contacted Mr. Victor Jones and Howard Matson of the Soil Conservation Service at Fort Worth and they offered their cooperation in making the survey.

On the 11th, Messrs. Victor Jones and C. C. Armes, SCS, Fort Worth, started the survey and it was completed on the 26th. Samples of the silt are being tested for mechanical analysis at our cooperative soil and silt laboratory.

Mr. O. V. Faris made the first survey in 1923 and Mr. Victor Jones made another one in 1937. At the time of the second survey Mr. Jones estimated the average rate of fill was 0.06 foot per year.

Irrigation Studies - Dean W. Bloodgood.-The 6-inch metal Parshall flume that was installed at the Ray Wood rice farm near Hockley on April 28 washed out by the water overtopping the flume and eroding the material on the low side of compacted soil that surrounded the flume. The flume was installed in a soil-cement material consisting of 2 sacks of cement to about one cubic yard of soil. The moisture in the soil and light sprinkling was the only water used for setting the material. On one side of the flume where the water did not overtop the flume and on a higher embankment of soil, the material had hardened the soil and there was no evidence of washing. Further experimental work with the soil-cement mixture will be necessary to determine its value for preventing the washing out of such measuring devices as flumes, weirs, etc.

The depth of the flume is 20 inches. On May 12 the depth of water flowing through the flume was 1.55 feet or about 4.10 second-feet (1,845 g.p.m.). On another visit (May 14) the flow had dropped to a depth of 1.46 feet, or 3.75 second-feet (1,688 g.p.m.). When other pumping plants in the Hockley area are started the flow will probably continue to drop or about one-half of the first discharge of the pump. The 6-inch flume is equipped with a flow recorder.

The 10-inch Sparling meter used to measure water for rice from the pumping plant of J. D. Wood near Brookshire was continuing to measure a steady flow of 1,600 g.p.m. The water is being used to irrigate a 300-acre rice farm.

In the Edna area, two 16-inch low head Sparling meters were installed during the latter part of the month; one at the Harrison Stafford (formerly Dr. Lee's farm) rice farm of 500 acres and the other one at Tom Babb rice farm of 500 acres. At both farms the irrigation water is pumped from Lavaca River. Rice has been planted and there has been some rainfall to bring the rice up. The irrigation season at both farms started about May 15.

The Eagle Pass area was visited by Mr. Beckwith on May 8, and he reports that the water measuring devices are functioning very nicely. The weir and flumes are equipped with flow recorders.

At the 5-foot weir installation the discharge was 11.60 second-feet -- most of which was used to irrigate fallow land before planting on the 1,100-acre tract in the Hopedale area. The 1-foot Parshall flume used to measure irrigation water for about 300 acres of cotton was measuring 7.26 second-feet. The 9-inch Parshall flume used to measure irrigation water for the 125-acre cotton farm of Jack Keisling below El Indio was not in operation and he was not irrigating.

Evaporation Studies - Dean W. Bloodgood.-One new standard evaporation station got well under way during the month. It is located at Harris Lake in the Lower Brazos River area. The Gas and Water Department, Dow Chemical Company, Freeport, and our cooperator, has purchased and received a recording rain gage, a standard rain gage, hygro-thermograph, sling psychrometer, anemometer, maximum and minimum thermometers, with shelter house and Townsend support. We have contracted for the construction of the 4-foot in diameter standard Weather Bureau Type A evaporation pan, a 6-foot in diameter Bureau of Plant Industry type evaporation pan, and a 24-inch in diameter U. S. Department of Agriculture or Division of Irrigation screened pan. These pans will be paid for from our State cooperative funds. We have been having difficulty in obtaining the proper material for the construction of the pans. The Weather Bureau of Houston will assist and supervise the installation of the station and instruct the operator (Dow Chemical Company man) in the operation and maintenance of the station.

Snow Surveys - Carl Rohwer, Fort Collins, Colorado.-The regular snow reports for May 1 were published and distributed. The water-supply outlook for Colorado, Wyoming, and New Mexico was above normal, but lack of rainfall in April and May has adversely affected germination of some crops. Recent heavy rains have improved conditions, but the accompanying hail in some sections has caused serious damage. Local floods have been reported on the Rio Grande, Uncompahgre, Gunnison and Yampa rivers.

Mr. Stockwell has been working on the "Summary of Snow Measurements in the Missouri-Arkansas Drainage Basins," which will be published as a Miscellaneous Series Paper of the Colorado Agricultural Experiment Station. The summaries for the Colorado and Rio Grande have already been published. On May 17, Mr. Stockwell gave an informal talk on "Snow Surveying" before the Reclamation Technical Club in Denver. He also showed the colored film "Snow Harvest" at the meeting.

Well Screen Performance Tests - Carl Rohwer.-Work was continued on the installation of equipment for the well screen project. A brief History of Ground-Water Development with special reference to California was prepared at the request of the Chief of the Division of Irrigation.

This report was for Senator Downey of California. A report on Irrigation Research in Colorado was prepared for the meeting of the Division of Irrigation at Logan, Utah, June 7 to 11, 1948.

Seepage from Irrigation Channels - Carl Rohwer.-The final proof of the bulletin on "Seepage Losses from Irrigation Channels" has been checked and the bulletin is now being printed. This report is being published by the Colorado Agricultural College as a technical bulletin.

R. A. Work, Medford, Oregon.-The May 1 report of Snow Surveys and Water Supply Forecast for Oregon was issued on May 8. With the forecast was issued the reprint of April 1 West-wide runoff forecast, as published by WESTERN CONSTRUCTION NEWS.

Frost and Work collaborated in preparation of a paper entitled "The Use of Snow Survey Data for Agricultural Planning" for presentation at the Annual Meeting of the American Society of Agricultural Engineers at Portland, Oregon, on June 21.

Work prepared a 70-page report of "Operation Sno-Cat Cascade." It was concluded from this experiment that it will not be practical for one mechanized crew of surveyors to traverse the crest of the Cascades, measuring snow courses en route. It will be more practical for the two-man crew to operate along the east toe of the Cascades. They would transport their Sno-Cat along foothill roads by mother truck, unloading at various points and running into various snow courses. This plan would reduce distance of over-snow travel from 570 to 350 miles, would reduce travel schedule by 6 days and would make more certain accomplishment of the necessary surveys.

Frost made correlation studies of a few long-record precipitation stations and the annual flow of Columbia River at The Dalles. Tree ring studies were introduced for extension of the record back to 1500. The studies are not conclusive as yet, but seem to show that the recent years of low runoff may be the most critical since 1500.

Snow Surveys and Water Supply Forecasting - James C. Marr, Boise, Idaho.-The Boise Research office of the Soil Conservation Service devoted considerable time until May 12 to the preparation of the May Snow Survey and Water Supply Forecast report. However, during this period Marr was away on assignment in the Colorado River Basin. In view of the severe losses being experienced during the past week as a result of high river stages and which is still in progress in northern Idaho and western Montana, attention is called to the flood warning given in the May 1 snow survey and water-supply forecasts for Columbia Basin.

Water Supply Outlook May 1, 1948 - James C. Marr.-"Retarded snow melt and above normal precipitation during April will increase the amount and rate of runoff throughout the northern and western parts of Columbia River Basin. The outlook a month ago in these areas for greater than normal runoff with possible flood hazard has changed to certainty of runoff of flood proportions with attendant damage in vulnerable areas."

"Flood hazard exists on the streams in northern Idaho, western Montana and in Washington. For the third consecutive year high water in Kootenai Valley at and below Bonners Ferry, Idaho, is expected. Based on the April 1, 1948 snow surveys, the runoff at Leonia, Idaho, for the period April 1 to September 30 was forecasted at 8,300,000 acre-feet. Due to the above normal Valley precipitation in this area during April and based on the present snow cover it appears now that this forecast should be raised to 8,900,000 acre-feet. According to preliminary calculations of the U. S. Geological Survey approximately 950,000 acre-feet passed Leonia, Idaho, during April. This leaves nearly 8,000,000 acre-feet still to come. This is roughly the same amount as flowed down the river during the 5-month period, May to September 1946 and 1947. During each of these years the large areas of reclaimed farm land along the river in the United States and Canada were endangered by the high river water level, but, damage was largely averted through the timely forecasts based on snow surveys and by the prompt action taken by the U. S. Engineers to hold the river dike. Now it is possible that high river stages will happen again possibly higher than either of the past two years and it is imperative that the situation be closely watched."

"More or less the same outlook for near maximum runoff and flood hazard holds for all the tributaries to Columbia River in northern Idaho, western Montana, Washington, and British Columbia. From 5 to 10 percent increase in the April 1, 1948, forecasts is anticipated. Also extra high water may be expected on all of these streams during the latter part of May and in June. This same situation may also extend to lower Columbia River."

Assistance to Franklin County Idaho Soil Conservation District.-Upon the request of the Soil Conservation Service Regional Office at Portland, Ore., Marr was assigned to an examination of Franklin County Idaho Soil Conservation District which has been newly formed to help decide upon an improvement program. Marr spent from April 26 to May 6 in the District. The program decided upon consisted of measures to control tremendous erosion occurring along Five Mile Creek; an educational program to improve the practice of irrigation which up to the present time has consisted largely of wild flooding; the lining of ditches through the sandy formation with clay material which is available in the upland adjoining the valley lands; and investigations to determine the best procedure to follow for draining extensive water logged areas.

Marr prepared a report covering these recommendations which is to be supplemental with other reports.

Hugh C. McKay, St. Anthony, Idaho.-The weed growth in the winter wheat this spring is very serious. Several complaints have been received about the wheat on stubble-mulch fallow being very weedy. All of the fields of wheat on stubble-mulch fallow were inspected to determine the seriousness of the weed growth, also adjoining fields were gone over. While there was considerable growth of weeds on the stubble-mulch fields, there was not any more than in the adjoining fields regardless of the plow used.

I believe the bad weed condition this year was caused by the late cold spring that allowed the weeds to grow and prevented the wheat from making much growth. The main weed is mustard and it stands up from 6 to 8 inches above the wheat and many fields look completely yellow.

The annual weeds have made such a heavy growth that nearly all of our dry farmers have either sprayed or dusted with 2,4-D to control them.

Due to the fact that many of the farmers blamed the stubble-mulch fallow for the weeds there is not as many acres in stubble mulch this year. However, the ones I have talked to agreed that there was as many weeds in the other fields.

